

THE LASIOCHILIDAE, LYCTOCORIDAE, AND ANTHOCORIDAE  
(HEMIPTERA: HETEROPTERA) OF THE HAWAIIAN ISLANDS:  
NATIVE OR INTRODUCED?

JOHN D. LATTIN

Department of Botany and Plant Pathology, Oregon State University, Corvallis,  
OR 97331-2902, U.S.A.

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*Abstract.*—Twenty-three species of Lasiochilidae, Lyctocoridae, and Anthocoridae are known from the Hawaiian Islands. Twelve species of Lyctocoridae (1 sp.) and Anthocoridae (11 spp.) are considered to be non-indigenous to these islands (52%). The history of each non-indigenous species and two native species are provided.

*Key Words:* Hemiptera, Heteroptera, Lasiochilidae, Lyctocoridae and Anthocoridae, Hawaiian Islands, endemic, native and non-indigenous species

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The true bug family Anthocoridae is now considered to represent three families: Lasiochilidae, Lyctocoridae, and Anthocoridae (Schuh and Štys 1991, Schuh and Slater 1995). This paper follows the higher classification of the former family Anthocoridae by Schuh and Štys (1991) and Schuh and Slater (1995). The higher classification of Anthocoridae follows the same authors, including the supra-generic classification at the tribal level. Higher categories above the tribes await a world-wide review for proper subfamily placement. The family organization extends from the most generalized (Lasiochilidae) to the most specialized (Lyctocoridae to Anthocoridae). Representatives of these families have been taken on one or more of the Hawaiian Islands (Zimmerman 1947, 1948; Nishida 1994, 1997, 2002; Brenner and Lattin 2001; Lattin 2005a). Twenty-three species of these families are presently known to have been taken on one or more of the islands.

Eleven (48%) species occur naturally on the islands (9 endemic and 2 native) and 12 (52%) species are considered non-indigenous. This is a remarkably high percentage of introduced species. Endemic is defined here as species occurring only on one or more of the Hawaiian islands and native is defined as occurring on one or more of the islands and also found naturally elsewhere.

The endemic species (confined to the Hawaiian Islands) and not treated in this paper include: *Lasiochilus decolor* (White) (1880), *L. denigratus* (White) (1880), *L. montivagus* (Kirkaldy) (1908), *L. nubigenus* Kirkaldy (1908), *L. silvicola* Kirkaldy (1908), *L. sp. nov.*, *Lilia dilecta* White (1880), *Orius persequens* (White) (1877), and *Scolopa sp. nov.* The new species stated above will be published elsewhere.

The two native species are *Alofa sodalis* (White) (1878) and *Physopleurella mundula* (White) (1877). *Alofa sodalis* (described as *Cardiastethus sodalis*) is

now known throughout the Pacific Region as well as Africa, North, Central and South America and the West Indies. It is difficult to state exactly where it occurs naturally, but early original description from the Hawaiian Island suggests that it is native to the Hawaiian Islands. *Physopleurella mundula* also was described from the Hawaiian Islands (as *Cardiastethus mundulus*). Swezey (1904) reported it feeding on various insects. Perkins (1906) stated that it was abundant in cane fields. Perkins (1913) presented a more extensive discussion of this species and its biology as he did with *Alofa sodalis* (as *Buchananiella sodalis*). Zimmerman (1948) recorded *Physopleurella mundula* from Hawai'i, Kaua'i, Maui, Molokai'i and O'ahu. Usinger reported it from Guam (1946) and Herring (1967) listed it from much of Micronesia. This bug is considered native to the Hawaiian Islands. Both species belong to the Anthoridae, Anthocorini.

#### Non-indigenous Species

Non-indigenous species are discussed below, including those introduced for potential biological control as well as those introduced accidentally, with families ordered from the least to most specialized:

#### Lycitoridae

*Lycitoris campestris* (Fabricius 1794) is the only member of the Lycitoridae found in the Hawaiian Islands. This species was described from Europe and has been introduced into many localities around the world by commerce. On the Hawaiian Islands, it has been found most commonly associated with litter in and around domestic animals (Beardsley 1981). *Nesidiocheilus hawaiiensis* was described by Kirkaldy in 1902 from Haleakala, Maui. It is now considered to be a synonym of *L. campestris* (Lattin 2006).

#### Anthocoridae

##### Anthocorini

*Macrotrachelia nigronitens* (Stål 1860) was described from Rio Janeiro, Brazil (as *Anthocoris nigronitens*). It was reported from Panama by Champion (1900). Davis and Krauss (1966) introduced 45 individuals from Cuernavaca, Morelos, Mexico at Aliomanu, O'ahu under the name *Macrotrachelia thripiformis* Champion 1900. This name was used by early authors discussing its introduction (e.g. Davis for Chong 1967, Davis and Chong 1968, Nishida 1994, 1997). I have examined a series of six specimens from the original introduction that are now in the Bishop Museum (Lattin 2005a) and have determined that they are *Macrotrachelia nigronitens* (Stål), not *M. thripiformis* Champion. This species was deliberately introduced for biological control of thrips but did not become established.

##### Dufouriellini

*Amphiareus constrictus* (Stål 1860) was described from Brazil (as *Xylocoris constrictus*). It was reported from Kaua'i and O'ahu by Zimmerman (1948) and Nishida (1994, 1997) (as *Cardiastethus fulvescens* (Walker) (1872), a synonym of *A. constrictus* Stål). Brenner and Lattin (2001) reported it from the island of Hawai'i. This species is considered an introduction into the Hawaiian Islands.

*Buchananiella continua* (White 1880) was described from Madeira (as *Cardiastethus continuus*). Later, it also was described from California by Blatchley (1934) (as *Cardiastethus cavicollis* Blatchley, now a synonym of *B. continua* (Lattin et al. 2001)). Péricart (1972) published a useful account from Europe and Ford (1979) reported *B. continua* from the Azores, Madeira, Reunion Island and Europe. Brenner and Lattin (2001) reported it from the island of Hawai'i, the first record of the species

from the Hawaiian Islands. It is considered introduced species in the Hawaiian Islands.

*Cardiastethus minutissimus* Usinger, 1946, was described from Guam. It is widespread throughout much of Micronesia (Herring 1967). It was first reported from Kaua'i by Beardsley (1977a) (as *Cardiastethus* sp.). Subsequently, it was reported from several localities on Kaua'i by Asquith and Messing (1992) and I have examined specimens in the Bishop Museum from O'ahu. Herring (1967) stated that several species of *Cardiastethus* were found "...in shipments of grain and other foodstuffs." This bug is considered to be an accidental introduction into Kaua'i and O'ahu and was so treated by Nishida (1994, 1997, 2002).

*Dufouriellus ater* (Dufour 1833) was described from Europe (as *Xylocoris ater*). This is another species that is widely distributed in Asia, Europe and North America (Péricart 1996). It was collected on the island of Hawai'i from the borings of *Plasithymus* beetles in *Chenopodium* (Lattin 2005a). This anthorid is a well-known predator of bark beetles. It is also associated with a variety of stored products where it feeds on other insects (Arbogast 1984). There is a possibility that it will be recovered from similar habitats in the Hawaiian Islands. It is considered an accidental introduction into the Hawaiian Islands.

### Oriini

*Montandoniella moraguesi* (Puton 1896) was described from Spain (as *Montandoniella moraguesi*). Péricart (1972) published an account of this species from Europe with excellent illustrations and considered the species to be widely distributed around the world. It has been introduced into many localities as a biological control agent against thrips on *Ficus*. Davis and Krauss (1965) reported the introduction of this

species from the Philippines into the Pauoa Valley, O'ahu and Port Allen, Kaua'i in 1964. It quickly became established and spread to other Hawaiian Islands without further intervention. In an unusual turn of events, *M. moraguesei* was found feeding on the thrips *Liothrips urichi* Karny, introduced into the Hawaiian Islands in 1953 as a biological control agent of an introduced weed, thus becoming a classic case of biotic interference (Reimer 1988).

*Orius insidiosus* (Say 1832) was described from "United States" (as *Reduvius insidiosus*) (this meant eastern United States to Say). It is widespread in central and eastern Canada and the United States and extends south through Mexico to South America and the West Indies (Herring 1966). According to Weber (1953), specimens were introduced into the Hawaiian Islands from Iowa and Missouri to assist in control of the corn earworm. It was first released at Mokule'ia, O'ahu in 1951. Oatman (1978) stated that this species did not become established on the islands. However, Vargas and Nishida (1980) reported the bug as a predator of the corn earworm on O'ahu and Takahara and Nishida (1981) reared it on oriental fruitfly eggs. Nishida (1994, 1997, 2002) reported it from Kaua'i and O'ahu.

*Orius tristicolor* (White 1880) was described from California (as *Triphleps tristicolor*). It is widely distributed in western North, Central, and South America (Herring 1966, Henry 1988). Davis and Krauss (1963, 1965) reported the introduction of *Orius tristicolor* into O'ahu (Moanalua) and Kaua'i (Port Allen), based on specimens received from Arizona. According to Clausen (1978), these introductions were not successful. Nishida (1994) included this species on his list but removed it in 1997. Cullney and Nagamine (2000) documented the introduction of this species for biological control in Hawai'i from 1978–1996.

Brenner and Lattin (2001) reported it from Mauna Kea, Hawai'i. It now seems that this species is established, most likely to be found at higher elevations on the islands.

*Paratriphleps laeviusculus* Champion, 1900, was described from Panama. Later, it also was reported from Honduras (Drake and Harris 1926), Peru (Hambleton 1944, Wille 1951), Florida (Bacheler and Baranowski 1975), Puerto Rico, Mexico and Panama (Henry 1988), and Nicaragua (Carpintero et al. 1997). It was first reported from the Hawaiian Islands by Beardsley (1977b), based on specimens from Ewa, O'ahu. Mau (1977) reported this species from eggplant flowers at Waimanalo, O'ahu in May. Nakahara (1981) cited it from Moloka'i and Asquith and Messing (1992) collected it on Kaua'i. This species has been taken from light traps around Honolulu near produce from the mainland. It is considered accidentally introduced in the Hawaiian Islands.

### Xylocorini

*Xylocoris (Arrostelus) flavipes* (Reuter 1875) was described from Algeria (as *Piezostethus flavipes*). It too has been distributed widely via commerce. Péricart (1972) discussed this species and provided excellent illustrations of both short and long winged individuals. There are two brachypterous specimens of this tiny species in the collections of the Bishop Museum from Honolulu and Kalmuki, O'ahu. The specimens were associated with sorghum feed and fertilizer (Lattin 2005a). This is an introduced species in the Hawaiian Islands.

*Xylocoris (Proxylocoris) galactinus* (Fieber 1837) was described from Europe (as *Anthocoris galactinus*) and has been distributed throughout much of the world by commerce. It was first reported from O'ahu by Van Duzee as *Xylocoris discalis* (Van Duzee 1936). Originally described as *Scoloposcelis discalis* Van

Duzee from southern California (1914), this species is now considered a synonym of *Xylocoris galactinus* (Fieber) (Lattin 2005b). Toyama and Ikeda (1976) reported *X. galactinus* from O'ahu taken around animal farms and I have identified specimens from Kaua'i, Maui and O'ahu in the collections of the Bishop Museum. This is a clear introduction into the Hawaiian Islands.

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